

ONONDAGA LAKE WATERSHED

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RURAL NONPOINT SOURCE MANAGEMENT PLAN

ONONDAGA CO. S.W.C.P.

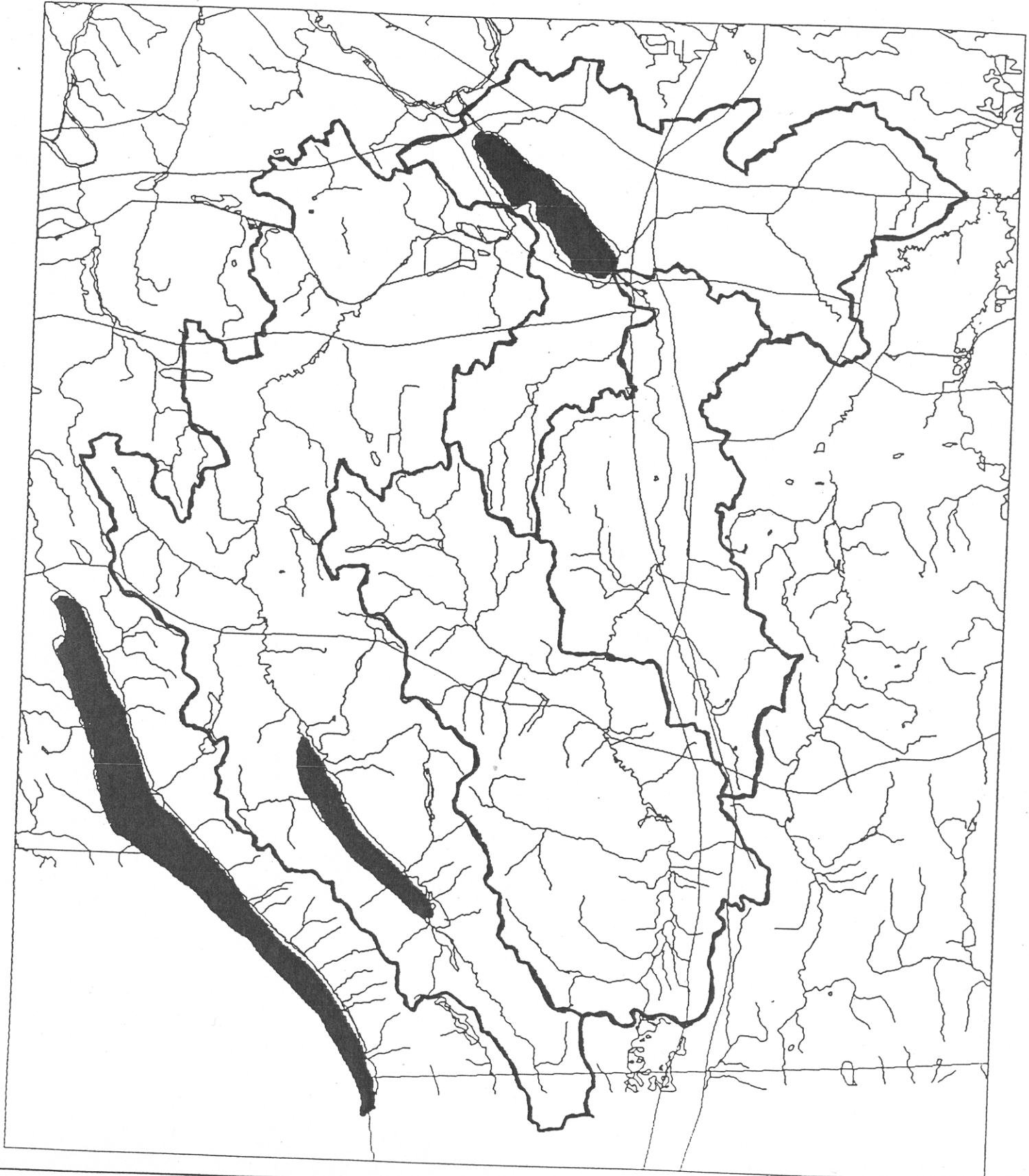
BACKGROUND: An ongoing effort is currently underway to clean up Onondaga Lake. To accomplish such an effort, one step in the process is to identify all sources of both point and nonpoint pollution entering the lake. Nonpoint source pollution is a troublesome water quality problem area since the source of the pollution is not readily apparent.

① One nonpoint source considered to be significant in Onondaga Lake is agricultural activities. Agriculture can be a source of sediment, nutrients, pesticides, organic material, and pathogens. Sediment which results from sheet and rill erosion, ephemeral gully erosion and classic gully erosion on cropland causes turbidity, reduced channel and lake capacity and reduced light penetration. Nutrients, particularly phosphorus, which causes eutrophication and promotes algae growth and aquatic vegetation is contributed by erosion and from improper fertilizer and manure management. Organic material which reduces oxygen levels in surface waters can originate from milkhouse waste and manure. Pathogens which are linked to water borne diseases can be introduced from improper manure handling. Finally, pesticides are contributed from improper pesticide handling and application activities.

DESCRIPTION OF STUDY AREA: The Onondaga Lake watershed is located almost entirely in Onondaga County in Central New York State. The watershed is comprised of four hydrologic watershed units which occupy the west central one-third of the county, including the city of Syracuse; Figure #1. The composite drainage area is 287.5 square miles (184,031 acres) which represents approximately 36 percent of Onondaga County. The watershed unit numbers are 04040201-360, 04040201-370, 04040201-380, and 04040201-385. Respective watershed names are Ninemile Creek (73,660 acres - 40 percent), Upper Onondaga Creek (43,767 acres - 23.8 percent), Lower Onondaga Creek (27,205 acres - 14.8 percent), and Ley Creek and Harbor Brook (39,399 acres - 21.4 percent). There are 107 agricultural operations within the Onondaga Lake watershed.

REASON FOR STUDY: The location, extent, and magnitude of problem areas attributed to agricultural nonpoint source pollution and the damages resulting from sedimentation and algae growth in the Onondaga Lake drainage basin are unknown. To quantify the agricultural nonpoint source inputs and to develop remedial recommendations, an inventory and evaluation of agriculture and agricultural activities was necessary.

FIGURE #1
ONONDAGA LAKE WATERSHED



INVENTORY PROCEDURE: The farms in the Onondaga Lake Watershed were inventoried in two phases; a general phase and a detailed phase; during the summer and fall of 1992. The general phase was undertaken to enumerate, characterize, and locate all agricultural operations with land in the watershed. The detailed phase consisted of farmer interviews to determine field and crop management activities such as cropping patterns, fertilization and pesticide application, and manure utilization. This phase of the inventory process was carried out on a statistically reliable sample; 25 percent; of the agricultural operations identified.

The farm inventory was conducted by the Onondaga County Soil and water Conservation District in cooperation with the U.S. Department of Agriculture, Soil Conservation Service.

Information collected included: location of farm headquarters; type of operation; acres of cropland; acres of pasture; acres owned and rented; number of animals; crop rotations; field characteristics; type, time, and orientation of tillage; conservation practices installed, soil test frequency; manure application rates and timing; fertilizer application rates and timing; pesticide application rates and timing; pasture times; method of milkhouse waste disposal; manure storage and distance from surface water; barnyard characteristics and distance from surface water; silo information; and cattle accessibility to streams.

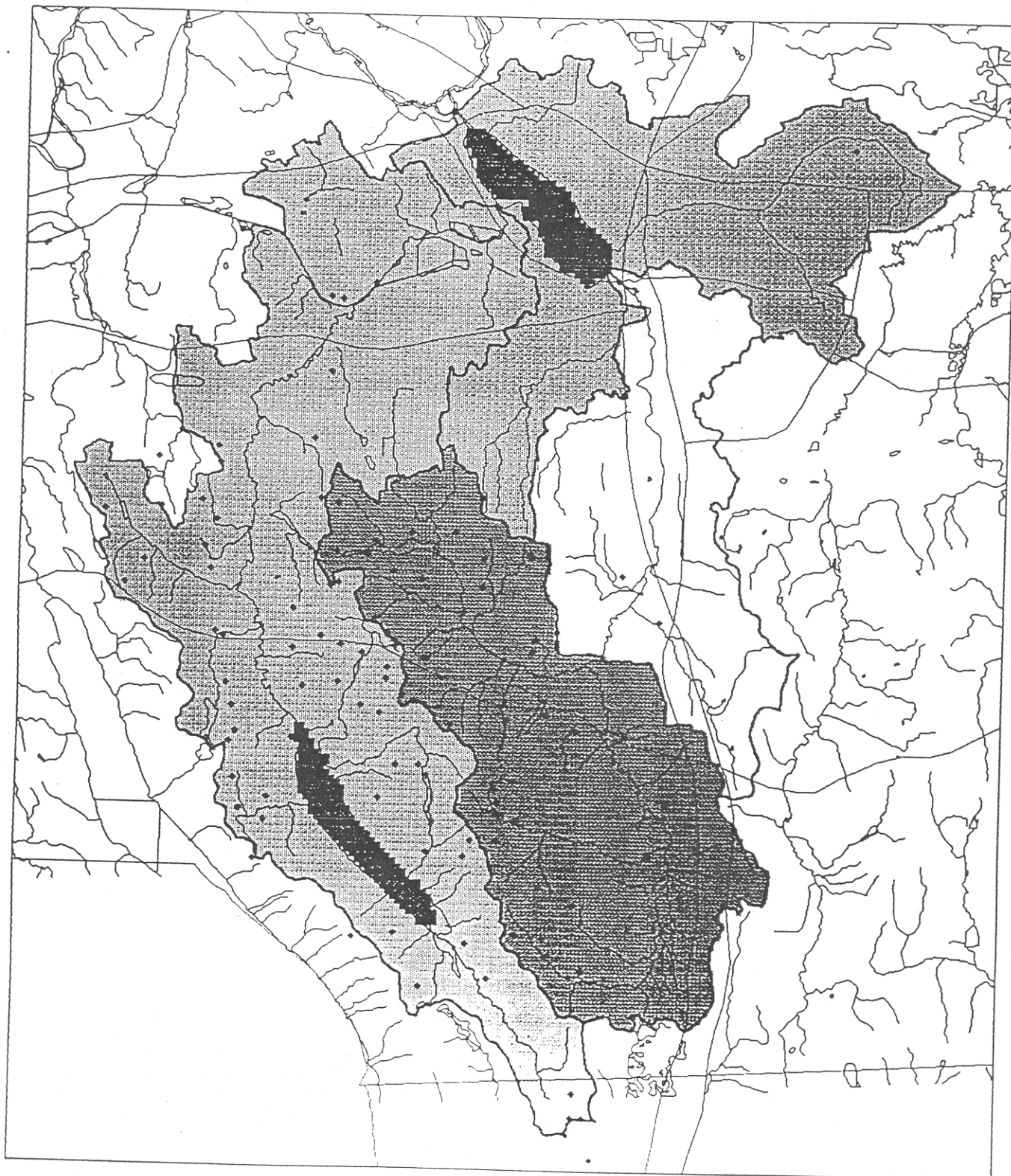
WATERSHED CHARACTERISTICS: The majority of the watershed is characterized by rolling topography, with steep slopes flanking broad, U-shaped valleys. This terrain is characteristic of the glaciated Allegheny Plateau which begins immediately south and west of the inner city of Syracuse. Soils are primarily developed on glacial outwash deposits in the extreme southern end and in the stream valleys of the watershed, and on glacial till in the valley walls and upland areas. Bedrock outcrops are numerous. The majority of the farms are located in this portion of the watershed; in the Ninemile Creek and Upper Onondaga Creek sub-basins. These subwatersheds contain 84.2 percent of the cropland acres and 100 percent of the orchards.

The land area immediately north and east of the inner city of Syracuse lies within the Erie-Ontario Plain. Soils in this section are primarily developed on glacial lake deposits, and topographically are nearly level. These sub-basins; Lower Onondaga Creek and Ley Creek and Harbor Brook; house 5 of the 107 farms in Onondaga Lake watershed.

FINDINGS:

Farm Numbers and Locations: There are 107 agricultural enterprises in the Onondaga Lake watershed. The majority of the farms are dairy, numbering 67. Figure #2 identifies the location of the headquarters of the 107 agricultural enterprises. Farms located outside the Onondaga Lake watershed represents farm headquarters of those farms with agricultural land within the watershed. The following table shows the distribution of farm types and associated acreage:

FIGURE #2
FARM LOCATIONS



ONONDAGA LAKE WATERSHED CROPLAND AND HAYLAND

FARM TYPE	NUMBER OF FARMS	ROW	CROP ACRES HAY	OTHER	TOTAL CROPLAND	PASTURE ACRES
BEEF	2	20	210	36	266	30
DAIRY	67	10,473	11,462	3,144	25,079	2,522
FIELD CROPS	21	3,231	1,412	695	5,338	63
HORSES	1	0	40	0	40	29
LIVE-STOCK*	4	153	187	62	402	402
NURSERY	1	0	0	160	160	0
ORCHARD	6	110	100	1,097	1,307	15
TREES	1	15	0	10	25	0
VEGETABLES	3	85	0	175	260	0
XMAS TREES	1	0	60	150	210	210
TOTAL	107	14,087	13,471	5,329	33,087	3,721

* Livestock includes sheep and swine.

This acreage is down from the 65,557 acres of cropland, hayland, orchards, and pasture identified by USGS in the 1978 GIS land use data series. This represents a 44.5 percent reduction in agriculture land use.

Of this, 101 of the farms and 94.8 percent of the agricultural land (34,545 acres) is located in the Ninemile Creek and Upper Onondaga Creek watersheds making up 26.8 percent of the land base (117,426.9 acres).

Animal concentrations in the Onondaga Lake watershed were also enumerated through the farm inventory. The following table shows the types and numbers of agricultural animals within the watershed.

ONONDAGA LAKE WATERSHED ANIMAL POPULATION

FARM TYPE	NUMBER OF FARMS	DAIRY COWS	DAIRY YSTOCK	BEEF CATTLE	BEEF YSTOCK	HORSES	OTHER LSTOCK	TOTAL
BEEF	2	0	0	65	36	0	0	101
DAIRY	67	6,385	4,694	91	39	29	156	11,394
FIELD CROPS	21	0	65	42	12	19	7	145
HORSES	1	0	0	0	0	36	0	36
LIVE-STOCK*	4	2	89	0	0	8	147	268
NURSERY	1	0	0	0	0	0	0	0
ORCHARD	6	65	60	4	0	0	2	131
TREES	1	0	0	0	0	0	0	0
VEGETABLES	3	0	0	0	0	0	0	0
XMAS TREES	1	0	0	0	0	0	0	0
TOTAL	107	6,474	4,908	202	87	92	312	12,075

*Livestock includes sheep and swine.

Of these 12,075 animals all but 294 dairy cattle and young stock are located in the Ninemile Creek and Upper Onondaga Creek watersheds.

Manure Production: These animals produce 417 tons of manure per day generating an annual nitrogen load of 764.4 tons and phosphate (P₂O₅) load of 310 tons. If applied evenly across the cropland in the watershed, these loads would be 48.9 pounds of nitrogen and 19.8 pounds of P₂O₅ per acre of cropland.

Detailed inventories were collected on 17 of the 65 dairy farms. Trends shown by the data include: barnyard distance from surface water is 10 to 2000 feet; 1 farm of 17 does not have barnyard improvements; 12 farms of 17 have animal concentration areas other than the barnyard; 15 of the 17 dairy farms use daily spreading to dispose of manure; cattle have direct access to streams on 11 of 17 dairy farms; and 14 of 17 dairy farms use septic tanks to dispose of milkhouse waste; .

Fertilizer usage has been characterized from detailed farm inventories on 118 fields throughout the watershed. The results indicate the following average rates (pounds per acre) of chemical fertilizer applied to corn and hay:

<u>CROP</u>	<u>NITROGEN</u>	<u>PHOSPHORUS</u>
Corn	66.1 lbs	56.9
Hay	23.6	51.8

Phosphorus recommendations on soils testing at a medium level is 40 pounds per acre for corn and is 20 pounds per acre for topdressing a mixed forage. Initial analysis indicates a surplus application of Phosphorous of 17 pounds per acre on corn and 32 pounds per acre on hayland.

Soil erosion throughout the watershed has been controlled to acceptable levels with farmers complying with the Food Security Act. However, in some instances, annual erosion rates may exceed the rotational averages and efforts should be undertaken to reduce these years.

Pesticide Management was identified for 5 fields out of 118 indicating a need for additional efforts in this area. Cultivation, however, was used on an additional 22 fields thereby reducing the need for pesticides.

RECOMMENDATIONS:

Although the water quality of Onondaga Lake is the result of industrial discharges, domestic waste discharges, and other point sources including combined sewer overflows; the clean up of Onondaga Lake cannot be completed without reducing the nonpoint sources of pollution which come from the watershed.

Through the Onondaga Lake Management Conference three studies have been undertaken to evaluate the influence of nonpoint sources; this evaluation of agricultural activity, an evaluation of urban nonpoint sources, and an evaluation of roadside erosion in the rural portion of the watershed.

Based on the evaluation of the Onondaga Lake watershed agriculture it appears that the farmers have developed and are following Food Security Act plans which are designed to limit soil erosion and prevent the conversion of wetlands to agricultural land. Sheet and rill soil erosion, therefore, is controlled to acceptable levels. Other agricultural contaminants, however, should be managed to provide for the long term clean up of Onondaga Lake. These pollutants include nutrients, pesticides, organics, and pathogens.

Recommendation #1: Information and Education Program - Source Reduction; A strong and continuous information program is essential to successfully implement both an agricultural and watershed wide nonpoint source pollution management and prevention program. The objective is to encourage a significant portion of landowners in the watershed to voluntarily install needed management practices to reduce nonpoint sources of pollution. Success of this recommendation depends on helping landowners develop an understanding of the problem and motivating them to action.

Support is needed for the Onondaga County Soil and Water Conservation District and Cornell Cooperative Extension of Onondaga County to provide leadership and technical assistance in this area.

Recommendation #2: Nutrient Management; analysis of fertilizer and manure application information provided by farmers indicate the application of a surplus of phosphorus by as much as 32 pounds per acre. Surplus phosphorus is, for the most part, tied up on the soil and its release is effectively controlled by soil erosion practices. Over time, however, the soil phosphorus levels become elevated and soluble phosphorus may be released from the soil environment. The best way to minimize the release the control of plant nutrients, nitrogen and phosphorus, into the surface waters is to manage the rate of application in accordance with the plant needs.

Support is needed for the Onondaga County Soil and Water Conservation District and Cornell Cooperative Extension of Onondaga County to provide leadership and technical assistance in this area.

Recommendation #3: A primary source on nutrients from agricultural operations is manure. In the past, manure has been considered a waste product to be disposed of accordingly. Today, manure is being visualized as an economic resource; a source of the nutrients necessary for plant growth. The adoption of nutrient and manure management, however, occurs slowly as farmers approach significant management changes cautiously to assure that these changes will not affect crop production.

In addition to nutrients, manure is also a source of bacteria and pathogens and organic material. These items can also be managed through a manure management program.

A manure management program consists of working with farmers to assure them of the nutrient value of the manure and to encourage them to use manure as a nutrient source. It also includes working with the farmer to develop manure spreading schedules to minimize the application of manure in sensitive areas.

Support is needed for the Onondaga County Soil and Water Conservation District, USDA Soil Conservation Service, and Cornell Cooperative Extension of Onondaga County to provide leadership and technical assistance in this area.

Recommendation #4: Pesticide Management; the utilization of pesticide management as a Management practice was identified on only 5 of 118 fields. This does not mean, however, that pesticides are widely or incorrectly used. Experience with the agricultural community indicate that dairy farmers do not use pesticides intensively. Furthermore, there are no indications of ground or surface contamination from pesticides in the watershed. Nevertheless, wise and proper use of pesticides is warranted.

Support is needed for the Onondaga County Soil and Water Conservation District, USDA Soil Conservation Service, and Cornell Cooperative Extension of Onondaga County to provide leadership and technical assistance in this area.

Recommendation #5: Livestock Exclusion; the farm inventory indicates that cattle have unrestricted access to streams on a majority of the farms in Onondaga Lake watershed. Animal manure is a source of nutrient, organic material and pathogens and unrestricted access provides a direct link to waters of Onondaga Lake. A stream protection program to provide controlled stream access for crossings and watering should be implemented. This program will be dependent on the SWCD information and education program and rely on the SCS for technical assistance in the design of stream crossings and water facilities.

Recommendation #6: Watershed Wide Nonpoint Source Pollution Control Strategy; nonpoint source pollution is generated by all land uses throughout the watershed. In order to control nonpoint source pollution; the urban, suburban and rural control programs should be merged into one watershed protection program to continually evaluate and update the watershed protection implementation programs. This program should be under the direction of the Onondaga County Water Quality Control Committee.